

# AVIATION

*The Oldest American Aeronautical Magazine*

NOVEMBER 17, 1928

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A flight picture of the "Comet" powered Towle "WC" amphibian.

VOLUME  
XXV

NUMBER  
21

## *Special Features*

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Financing Wholesale and Retail Sales  
The New N. A. C. A. Low Drag Cowling

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The Oldest American Aeronautical Magazine

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HERBERT F. POWELL, Press Editor  
DAVID J. LEHR, Asst. Editor

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## Twice Told Tales

**H**OW long will the airline operator buy planes, and then find that they are not perfect up to the specifications? How long will it be before the private owner can buy a plane and know that it is not being fooled as to the plane's performance?

The answer to these questions is, "Probably never." The fact concerning a plane can be ascertained, but until the public absolutely insists that accurate information be made available, it probably never will see the light of day. Currently enough, the public does not want it. It entirely fails to be forced which is lucky for the airline industry. There is one class, however, which should have good performance data, but often does not, and that class consists of the builders of aircraft. Especially among the smaller manufacturers, there is a tendency to accept approximations as to performance. A speed course about a mile, long to show, and a test pilot, who wants to keep his job, times himself by stepping a stop watch. The results may be in error by some 10 or 15 m.p.h. Accurate results can be obtained only by accurate instruments handled by trained personnel. There are very few pilots who can operate test flights. What is more, there are a great many designers who find it expedient to make up on the slide rule when figuring out the addition, which need be made, due to side winds.

The government has several flight testing stations for heavier-than-air craft. Several universities are equipped and ready to make tests. The tests will cost money. They will take a pilot's time, and they may prove extremely disappointing to the engineers, but progressively interesting to the builders and financial backers of the aircraft. There is no one trying to push the sale of a plane of inferior design. There is no one in bringing out a new model if it does not fit as well as the old model. This information can be obtained only by accurate testing and on the whole, accurate testing cannot be done by the manufacturer, but must be placed in the hands of impartial observers. An inferior design can be changed, but the rebuilding from the production of an inferior design cannot be remedied.

## A Dangerous Situation

**A** HEARING before the Federal Radio Commission is to be held in a few weeks in order that adequate radio channels may be assigned for aircraft communication to the companies requesting them. Unfortunately for aviation, the matter comes up at a poor time, when no one company seems able to decide just what type of radio installation is best suited to the special work of American airlines. This fact matters, there is as much diversity of opinion in the field of radio as there are experts.

The Federal Radio Commission is considering the needs of aviation at the present time, but it is obvious that unless

the industry manages to "get together" and arrives at a definite conclusion in the shape of a well considered plan that will stand up under the attacks of other business interests, which are eager also to obtain space on the first-aid radio spectrum, some one is going to be "out of luck."

Millions of dollars have been invested in equipment to extend the public or to merely keep aviation a constant. It is reasonable to suppose that the interests owning this equipment have not been asleep, that they have estimated their radio requirements, and that they will not be backward in presenting proof of what they want.

The air transport companies now must make up for lost time. They must produce a plan containing exact information as to the number of channels they need and why. They should be prepared to give proof of some sort that they do need these channels, and they should be ready and able to explain before the board why it is they need them more than the broadcaster, or other commercial interests.

The necessity for a good system of communication between a plane and the ground field is becoming more and more apparent. Several suggestions have been made to develop light radio sets operating on high frequency. Whether this is the solution to the problem, it remains to be seen. One noted expert states that one may attack the problem from a mechanical standpoint and by using the medium frequencies, which we know to be reliable, in fact for their use special, light, and small sets for aircraft. Meanwhile, it should be suggested by the industry that a possible two-way traffic must be obtained for service. Whatever type of equipment is finally selected, the industry must be prepared to describe it so that adequate and desirable channels may be used for aviation.

## Please Note

**O**UR circulation manager has informed us that 60 per cent of the subscriptions to AVIATION expire with the last issue in December, and in order that no subscriber will miss an issue as the result of not being aware of his expiration date, the suggestion is herewith made to look at the wrapper of your next issue. If it bears the figures 12-31-38 it means that your subscription expires December 31, 1938.

This expiration has proved that a number who renewed their subscriptions last were disappointed in obtaining last issues as they had been gone out of print. Our records show that this year we had 325 renewals of the January 2 issue and 283 copies of the January 9 issue, and that on January 12 there were entirely sold, and both were gone out of print. In order that such a condition may be avoided it is requested that if you desire to renew your subscription to AVIATION, you send in your renewal order ahead of time.

# The New N. A. C. A. Low Drag Cowling

By FRED E. WEICK

Aeromedical Engineer, N. A. C. A.

**S**TATIC radial air-cooled engines are classed by some engineers as possessing several advantages over engines of other types, among which are low weight per horsepower, the small number of parts required, and the consequent reliability and low cost of maintenance. They are now widely used, and are still gaining favor both in commercial and military aeronautics. They have had, however, one outstanding disadvantage—their extremely high air resistance, caused by the large frontal area and very poor aerodynamic form. The high drag has been a serious handicap in the field of high speed pursuit planes and single seat fighters, but the low weight of the air-cooled radial has some advantages.

Current designers have attempted to reduce the drag due to the air-cooled radial engine by enclosing varying amounts of it within the nose of the fuselage to result. There has been a wide difference of opinion regarding the best forms and amounts of cowling, and its effect on the drag and the cooling of the engine. Some designers have cowed in almost the entire engine leaving only the cylinder heads and valve ports exposed, while others have been content to leave the engine entirely exposed. Practically no accurate or reliable information has been available on the subject, for until very recently there has been no practical way of obtaining it.

The National Advisory Committee for Aeronautics has made a practice for several of the last few years of inviting the aircraft manufacturers and their representatives to spend a day at the Committee's laboratory at Langley



The N. A. C. A. complete cowling as it was finally developed. Note the cut-outs over the propeller.

just being completed, on the cooling of radial air-cooled engines. The new tunnel, in which an amount of 110 m. p. can be obtained, is used for the purpose. An actual full size airplane can be accommodated except for the wing tips, and the engine can be run with its propeller in its flight. The propeller thrust, airspeed drag, and propeller efficiency may be measured under flight conditions but with laboratory accuracy, so that small differences due to slight changes in cooling are brought out, and thermocouples can be used to obtain the temperatures at a large number of points on the cylinders so that the effect of the cowling on the cooling can be studied.

In working out a program for the cowling tests, it was thought desirable to exclude not only all of the main conventional forms of cowling, but also to have them arranged in series with various degrees or amounts of cowling. At one extreme of the series, the engine was left entirely exposed except for the nose of the cowling where it was fitted to a fuselage. For the other extreme, it seemed logical to enclose the entire engine. This involved problems in design, for it was of course desired to have the drag as low as possible, but still have the engine cool satisfactorily. It was easy to design a form enclosing the engine and having a low drag, but there was no information available as to the best means of cooling the engine. It was desired to make the outside of the complete cowling of greater cross-section and smooth form, without individual cylinder fairings such as have been used on a few experimental airplanes, particularly in England. This was done partly for the

size of simplicity and partly because in the case of most American radial engines, and especially the Wright Whirlwind J-5 which was used in this investigation, there is so little space between adjacent cylinders that individual fairings are impractical. It was necessary, of course, with the cowling entirely covering the engine, to provide the air used for cooling the cylinders from the general flow about the body, grade it past the cylinders,



The standard Curtiss AT-5A (Curtiss "Hawk") of the Army Air Corp., equipped with a "Whirlwind" engine.

and then return it to the outside air again. If the opposite and the return could be made smoothly, it seemed likely that a large decrease in drag could be obtained.

It was decided that the cooling air for all the cylinders could be taken in most satisfactorily at the center of the nose where the air pressure on the body, when in motion, is greatest. This allowed a single symmetrical design and a smooth separation of the cooling air from the general flow. Regarding the matter of returning the used cooling air to the general flow again, suggestions were obtained from the staff in charge of the low-drag atmospheric wind tunnel of the laboratory, who had done some work on wing slots and boundary layer control. As a result, the new cowling was designed with an annular slot extending entirely around the circumference of the body a short distance behind the engine. In section the slot was similar to some wing slots in which the air passing through is directed immediately along the surface. Rough comparative tests on two small model fuselages were then made in the open-air wind tunnel, and those indicated that a substantial reduction in drag at a reasonable flow of air through the nose and tail slot would be obtained. The flow of cooling air is helped by the fact that the outside air pressure at the nose is the highest and that at the slot about the lowest found over the entire body, when the body is in motion with respect to the air.

A program of tests was drawn up including both extremes of cowling and several conventional intermediate steps, both with and without spinners and on a cylinder type and an open cockpit type fuselage. This program was then submitted to the manufacturers for criticism and suggestions, several of which were adopted. As the tests were finally made, the cowling with slots of cowling was first constructed and compared with that for the uncowled engine. Then the cowling was modified, if necessary, and mounted until the cooling was approximately as satisfactory as for the entirely exposed engine. After that, tests were made on the drag and the propeller efficiency.

The portion of the investigation involving the entire fuselage has been completed, and tests are now being made with the smaller open cockpit fuselages.

One of the first findings of the tests was the enormous amount of drag due to the uncowled engine. The drag of the bare open fuselage with the engine removed and nose rounded was more than tripled by the addition of the engine, and that of the open cockpit fuselage was increased nearly five times. In fact, the drag of the open cockpit fuselage was about 10 per cent greater than that of the entire fuselage with the same engine cowed, even though the open cockpit fuselage had only half the cross-sectional area of the other. The larger body behind the engine evidently has a beneficial effect on the drag, and the drag of a small fuselage without engine is insignificant compared with that when the engine is added. The cowling with a wing engine nacelle would probably be at least as bad as with a small fuselage. These facts showed plainly that there was an opportunity for great improvement, especially in the case of small fuselages and engine nacelles.

The next outstanding development of the tests was that the conventional cowling, in which only the central portion of the engine is covered, had but slight effect in reducing the drag. Even in the extreme case, in which a large spinner was used and the entire engine was covered except for the tips of the cylinder heads and valve gear, the reduction in drag was comparatively small. Spinners are conventionally used in front of the projecting cylinders of radial engines because of their having a negligible effect on performance.

When the new N. A. C. A. cowling completely enclosing the engine was first tested, an exceptionally low drag was obtained, but the engine ran much too hot. The cowling was modified and rotated many times before the engine cooled properly, but finally the cooling was approximately as satisfactory as with the uncowled en-



Wind tunnel tests conducted by the N. A. C. A. showed that this cowling had the least drag of any of the conventional types, although it was necessary to cut slots in front of the cylinders to obtain proper cooling.

gine. To accomplish this, it had been necessary to enlarge the hole in the nose, provide cut-outs over the magneto, enlarge the slot, and grade the casing as past the hottest parts of the cylinders. In this connection, there is still room for improvement in the effective use of the cooling air, with a possible further gain in performance.

The reduction in drag of the entire fuselage with the first cowling, which could satisfactorily with the engine completely enclosed, was 26 times as great as with the



Front corner view of the Army Air Corps Curtiss AT-5A (Curtiss "Hawk") which has been equipped with the new N. A. C. A. cowling.

field, in order that they may become more familiar with the work and facilities, and make suggestions regarding research which would be helpful to them. At the meeting held on May 24, 1937, the manufacturers were particularly interested in seeing that an investigation be made in the new 20 ft. propeller research wind tunnel, than

—An engine, fuselage of this type and the second cowling as given in Figs. 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

# Financing Wholesale and Retail Sales

By CHARLES F. McREYNOLDS

SINCE several Southern California aircraft distributors, with the help of finance companies, have incorporated a time payment plan for the purchase of airplanes, these companies have received requests from all parts of the country as to the nature of this plan. Requests for information have come from some of the largest airplane distributors in the United States, and from many finance companies.

Such letters indicate that there is already a widespread need for the adoption of some plan for the financing of airplane sales, and also that in most sections of the country no practical plan has yet been made available to the dealer.

It is quite natural that Southern California, with the highest per capita rate of airplane sales, should be among the first to develop the time payment plan, and it is to be hoped that the experience which has been gained there will prove of value to many other dealers.

The plan was worked out about a year ago by Harry J. Coffman, manager of the Automobile Department, California Standard Finance Corp., Los Angeles, in conjunction with Jack Daubis, sales manager for the Aero Corporation of California. This plan gave the dealer financing for both the wholesale purchase and retail sale of airplanes. During the past year approximately 10 per cent of Raytheon's sales by the Aero Corporation of California are said to have been made with the help of this plan.

## Sales on Time Being Increasing

Both Daubis and Coffman state that the percentage of sales made on time is rapidly increasing and should soon represent a majority of all aircraft sales. Certainly this financing plan has brought about many sales which could not otherwise have been made and since the customer pays all financing charges there is every reason for the dealer and distributor to promote the practice of selling on time.

Under the California Standard Finance Company's plan the contingent liability resting with the distributor is greatly lessened by requiring complete insurance coverage, including fire, theft, and windstorm, and some form of crash insurance; and by requiring the purchaser to obtain at least one person of established financial standing as co-signer of the note.

The obtaining of insurance was the most difficult problem in connection with working out a time sales plan, but this situation is rapidly improving due to the lower rates and easier ease with which aircraft insurance may be obtained. The chief trouble is obtaining insurance on the experience of the pilot, character of work for which the plane is intended, territory only which it is to be flown and nature of the landing fields from which operated. Since the dealer can usually influence these



Front quarter view of a Waco 30, three passenger, open cockpit biplane. This plane is powered with a 50-5 engine.

factors thoroughly the insurance problem is greatly simplified.

As explained by Jack Daubis, the plan under which Raytheon airplanes are marketed by the Aero Corporation of California is approximately as follows: the sale and chattel mortgage being endorsed over to the finance company.

The Raytheon delivered at the Los Angeles field, including a rebuilt C33 engine, propeller, freight, etc., sells for \$3,550. Insurance costs approximately \$100, which gives a total of \$3,650. One third of the \$3,650 or \$1,213.33, which is the down payment. This represents one-third of the total, including insurance, but less interest, which leaves a balance of \$2,436.67 at 31 per cent interest, which is \$271.35, making \$2,708.02 to be divided up in 12 equal monthly payments of \$225.66. The total added cost of the plane to the purchaser is \$225.66 but this covers insurance on the plane. It also makes possible the purchase of the plane at a time when it might not have been available due to lack of adequate capital and then makes it possible to pay the balance of its cost from the earnings in operation. This method of financing also makes it possible for transport operators to pay their costs as each equipped on the more capital investment. It is to be observed that the finance company is also providing a time payment plan on the insurance cost under this plan, instead of adding the total cost of insurance to the down payment.

Soon after the California Standard Finance Co. had placed this plan in operation the lowering of insurance rates on aircraft induced the Pacific Finance Corp., of Los Angeles, to start an airplane sales financing department under the direction of W. F. Van Buren. Sales were first financed for Arthur R. Borne, president of

California Airways, and more recently for Theodore T. Hall, president of the American Aircraft Corp., western distributor of Waco and Pauchard products and said to be the largest retail distributor of aircraft in the world.

Mr. Hall has vigorously pushed the time payment plan with the result that it is now used in more than 10 per cent of his sales and is rapidly increasing in its application. This rapid increase is partly due to the reputation of the Belmont-Lewis Insurance Agency, which has assumed purchasers in obtaining favorable contracts from Babcock and Wilcox, now offering a comprehensive and practical insurance service in the western field.

The Pacific Finance Co. plan under which the American Aircraft Corp. operates is essentially the same as that of the California Standard Finance Corp. The interest rate is one per cent lower but this is offset by the requirement that insurance must be paid with the down payment on the plane.

## Down Payments Easy to Set

According to Miss Helen Lee, corporate secretary for the American Aircraft Corp., it is possible to finance the purchase of a plane with down payments ranging from 30 to 70 per cent. Under the 30 per cent plan a standard C33 Waco delivered at Los Angeles for \$2,355, would cost approximately \$400 to finance over a 12 month period. This would include insurance covering fire, theft, windstorm, and partial crash. The present insurance rate of fire, theft and windstorm is said to be from 45 to 75 per cent, but the full crash coverage at approximately 10 per cent, is very nearly prohibitive and is not accepted by the purchaser unless the airplane is to be used in an extremely hazardous work. If a down payment of as high as 70 per cent is made it reduces the carrying charge for the 12 month period by about \$100. There is, however, no provision for refinancing the purchase at the end of 12 months as is done with automobile sales, full payment being required within the time limit set by the original company under penalty of repossession. At the present time it is necessary to add the cost of the insurance to the down payment under this plan.

It is said that many private owners buying under this plan have found it possible to meet the bulk of the payments by renting their planes for charter trips or rush periods at pay per hour.

Buying airplanes wholesale from the factory and warehousing them in Los Angeles is proving an economical procedure under the financing plan. Financing, insurance, and warehouse rents are all low for this service and the planes are made available to the private owner on short

notice and without subjecting them to the high rate of insurance which would be required were they flown to the field direct from the factory. Warehousing also decreases petty pilferage and many dealers are taking advantage of the plan in order to avoid proper leasing of the planes until delivered to the purchaser.

Officials of both finance companies are enthusiastic over the way in which the plan is working out and predict that the mass air voyage will soon be reduced to the same level as those obtained in the automobile time sales field. It is possible for certain purchasers of aircraft to save money at the present time by obtaining the signature of persons of established financial stability as to make it unnecessary to provide insurance. In other cases where insurance is carried and the purchaser is of good standing it is sometimes possible to finance the sale without requiring any co-signer of the note.

Since the California Standard Finance Corp. was perhaps the first such organization in the country to definitely enter the field of financing retail aircraft sales it is interesting to know the reasons for this action and the results which have been obtained.

Officials of the Aero Corporation of California managed to sell the idea of financing sales to Harry J. Coffman of The Standard Finance Corp., and he worked out a plan which incorporated a high degree of protection for the finance company with a high rate of return and placed it in operation on his personal responsibility and without knowledge of the other directors. When it became apparent that the plan was succeeding he had it before the board of directors and immediately received their approval for an extension of the scheme. Since that time it has been possible to lower the interest rate twice and to relax many of the former restrictions under which the purchaser was able to obtain instant insurance. The credit department of the finance company thoroughly investigates every applicant for assistance (not as that way dissuades questionable purchasers). Approximately 30 airplanes have been financed by this company in the past year, ranging in price from Monomotors to Fokker Super-Catapults, and not one repossession has been necessary. In one case a plane was temporarily placed in storage but it was easily worth more than the outstanding indebtedness and the purchaser later proved able to fulfill the contract.

The California Standard Finance Co. has provided financing for aircraft sales ranging from wholesale purchases by the distributor to retail sales to individuals. The plan has worked for an entire year with a 100 per cent record and has received the finance company's unqualified consent upon the money invested in this financing.

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A front quarter view of a Fokker "Super-Catapult" monoplane, powered with a 50-5 engine.

# Operation of Western Air Express

By JAMES G. WOOLLEY

Vice-President in Charge of Traffic, Western Air Express, Inc.

**A**n aviator may attain individual success by performing some spectacular flight, but to those of us engaged in the business of commercial air transport success can come only as a result of hard work and strict attention to details. The program Western Air Express, Inc., has made during the last two years and eight months under the direction of Harry M. Hambach, its president, can be attributed to the fact that the company has been operated with same care as precision is a great railroad transportation system.

Originally, the company was organized to operate an air mail route from Los Angeles to Salt Lake City, this service starting April 17, 1936. Ever since then has included expanding the Salt Lake has for the carrying of passenger and express, establishing an air mail, passenger and express service between Pacific, Colorado Springs, Denver and Cheyenne, the inaugurating of a de luxe passenger and express service between Los Angeles and San Francisco, and the acquisition of the Pacific Marine Airways operating passenger service between Los Angeles and Ancon, Panama Island.

Further expansion is evidenced by two present announcements: first, the capital stock of Western Air Express has been increased from \$1,000,000 to \$2,000,000 and all the stock has been taken without a public sale; second, approximately \$1,000,000 is being expended for new airplanes. The new equipment will include 10 tri-engine, 12 passenger Sikorsky amphibians and three bi-engine, 8 passenger Fokker amphibian planes.

The large Fokker planes will be used to extend Western Air Express passenger service eastward from Los Angeles. The exact route to be followed has not been announced, nor has the exact date for the inauguration of the service been determined. It can be stated, however, that the air-

ways will be inaugurated as soon as practicable and it will be de luxe in every particular.

Sikorsky amphibians will supplement a fleet of flying boats now operating between Los Angeles harbor and Catalina Island and during the summer months they will be used for special trips in California lake resorts and to coast cities.

In operation, Western Air Express duplicates that prevailing in the modern railroad system, only of course, smaller. There is a president, who is also general manager; a vice-president who has charge of operations; a second vice-president who controls all traffic, and the secretary-treasurer directs the auditing department. All are co-ordinated under the personal direction of the president, Mr. Hambach, to whom daily reports of every activity are submitted.

## All Operations Under One Roof

The vice-president, in charge of operations, has control of all airplanes, the purchase of new planes and their maintenance. He also controls all pilots, mechanics and helpers, field managers and radio operators, and directs the upkeep of airports and field improvements.

No pilot is employed who has not passed the tests prescribed by the Department of Commerce and been licensed. The same is true of mechanics. Pilots and mechanics must come highly recommended both as to ability and character. First employment of a pilot is sort of probationary; he must prove that his ability equals his recommendations before he is given a steady run. Life insurance, with the family saved to redundancy, is carried in favor of all pilots, a courtesy that tends to keep them steady with the company. It may be said that the pilots



A Pratt & Whitney Sikorsky "Amphibian" in the service of Western Air Express.

who started with the company 32 months ago are still on the payroll.

For the co-ordination of work at all air fields and by Western Air Express, the company keeps a superintendent of operations who maintains personal contact with the field managers, the pilots, the master mechanics and all others within the department. Naturally, the company has ten landing fields, but two of these probably should not be classed as fields for they are on the water. One is in the Los Angeles harbor, at Wilmington; the other is Ancon, Bay, Panama Island. But these water areas must be kept close for a passenger service that is maintained every day of the year and the two terminals must have their managers.

In this connection it may be remarked that Western Air Express is probably unique among all air transport companies in the United States in the variety of its equipment. Not only does it own and operate large cabin planes and smaller open planes, flying boats and amphibians, automobiles and motor trucks, but it also has motorboats for its over-the-water service.

The base airport of Western Air Express is Van Field, Los Angeles, and there are located the main machine shops, the chief weather bureau and radio station, and the executive offices of the superintendant of all airports. This airport, completely equipped for day and night flying, is controlled and used exclusively by Western Air Express. It shares flying facilities with other companies at Childress, Salt Lake City, Las Vegas, Pueblo, Colorado Springs, Denver and Cheyenne and maintains field managers at all of these airports.

## Pilots Rigidly Inspected

Careful inspection of an airplane is required after every flight. At the home airport in Los Angeles and at Denver, where machine shops also are maintained, these inspections uniformly are made by two mechanics, each of whom files a separate report of conditions found and work done.

These reports are checked against each other. Previous to this the pilot has made a written report of any defect that may have been noticed during the flight. After approximately every 200 hr. of flying, each engine is completely torn down and reassembled, with each replacement and repairs as may be necessary.

Throughout the entire system the rule is enforced that "Civil means do not go." Everything has to be in working order every report, where there is a possibility of a conflict, must be made to conform to all other reports.

At the two main machine shops—Los Angeles and

Denver—the equipment is such that an engine can be entirely rebuilt. Spare parts and entire engines are kept constantly on hand. Within one recent week six Pratt and Whitney "Wasp" engines were delivered to Van Field at Los Angeles to be held as "spares." That is a precaution against possible delays on the passenger service between Los Angeles and San Francisco over which Fokker planes using Wasp engines are operated.

## Emergency Landing Fields Mapped

As another precaution, the company has taken great care to map emergency landing fields along every route over which its pilots fly. Before the Los Angeles-Salt Lake City line was established five suitable surveys of the territory were made and 50 emergency landing fields located. The distance for the entire field is only 600 mi. No plane has ever come to grief on this line.

On the Pueblo-Cheyenne route, 199 mi. in length, there are the four regular landing fields and 10 emergency fields; also this survey is known as the best lighted air route flying of all airways in the United States. There has been one serious accident on this line due to lightning.

On the Los Angeles-San Francisco line there is no place where a landing field is more than 40 mi. distant; ordinarily the distance is not more than 10 mi. The air distance between the two cities is 325 mi. There has never been the thought of an accident on this line.

On the Los Angeles-California Island run no attention need be paid to emergency landing fields for there is the broad expanse of the Pacific to welcome the amphibian or the flying boat if it needs to come down. This line has been in operation seven years and it has never had an accident. To the contrary, the flying boats have been used several times to rescue oceanmen who have ventured too far from shore.

The Los Angeles-San Francisco passenger route is equipped with probably the most elaborate weather reporting system to be found on any airway in the United States. It was established by the Daniel Guggenheim Fund for the Promotion of Aeronautics in co-operation with the U. S. Weather Bureau. This service given to the pilots reports on weather conditions from 35 stations along the 365 mi. to be flown. The reports covering observations along the direct survey and 25 mi. to each side of that survey. The pilot thus has order of any approaching storm or fog and has a complete knowledge of weather conditions along a 30-mile-wide stretch. In addition,

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A Western Air Express' Fokker monoplanes ready for loading at the Los Angeles terminal of the line.

# Alexander Production

*A Unique System Utilizing an Overhead Trolley 7,000 Ft. Long is Employed in the Plant of Alexander Aircraft Co.*

By WILLIS PARKER

THIS production line in the new plant of the Alexander Aircraft Co., Colorado Springs, Colo., is peculiar in arrangement inasmuch as it takes into consideration the "front door," the "back door" and the "back door." Almost no assembly is taken for a ride of more than 700 ft. in the open air before it reaches the final assembly and takes to the air as a part of a finished airplane. Hence the "back door" and the trolley system are vital factors and incidents in the production line. In some respects, one might say that the trolley system is the production line, and so such it follows a winding path.

Much of the wandering of the production line is due to the safety features incorporated in the plant. The Lockheed building is located about 700 ft. from the main factory building. The dope rooms and the paint shop likewise are separate from the main plant with distances of more than 500 ft. between. This makes it necessary to place the various departments in the main plant at points where the materials and sub-assemblies may be picked up and removed quickly and easily from the departments to the outside sections and back again and into the next section of the fabrication system.

## Materials Move in Two Directions

Hence the materials move in two directions. They move offshore from the front of the long building toward the rear and also inshore toward the middle, until they have reached the stage of completion that permits them to go into the final assembly line which is at the end of the main plant. The final assembly moves from the rear of the building to the front, where the fully rigged planes emerge and are loaded to the testing and flying field.

The stock rooms are located along the front of the building in line with the engineering offices and research department. This is because the material facilities are in front of the main plant. A spur track will enable the firm to unload materials directly from the freight cars to the storage departments, and to load finished planes for shipment direct from the end of the assembly line onto the freight cars. For the sake of better description of the movement of materials and sub-assemblies, we will assume that the reader is an observer, who is standing in front of the main plant and looking toward it. The main stock room will be directly in front of him, the engineering office just a little to his right and the research department as his extreme right. The wood storage space will be slightly to his left. At the end of the production line, where the completely rigged planes leave the factory, on his extreme left. The building is 450 ft. long and is 204 ft. wide.

The trolley leaves the stockroom at the right. Just outside of the door is a taxi, which runs the material two

the required lengths and at the proper angles. From the taxi, it moves toward the middle of the building to the welding shop.

Further to the right, and at the end of the building, is the machine shop. The top of the main plant is the wing blades outside of this end of the building for overhead adjustments and other mechanical attention. In this section are the machines which pump out small parts and in other types of machine work necessary around a plant of this sort.

To the rear of the machine shop is the sheet metal department, occupying a corner position.

When the various sub-assemblies are completed in the welding department, they are loaded to trucks, attached to the overhead trolley system, and are conveyed from



A view of the trolley system, which connects the paint, dope and finish buildings with the main plant.

this department to the rear door to the Lisonal room, which is about 700 ft. from the plant. Here, they are lowered into a huge vat of Lisonal. They are then raised and are loaded to one side for drying. After this, they are returned to the main plant on the return track of the trolley system, and enter the fuselage assembly department, which occupies the center of the building.

In the meantime, the wood working department has been turning out sub-assemblies which also are removed, when finished, to the Lisonal department.

From the wood storage section, the material moves straight ahead to the woodworking machinery. Then the small pieces move to the right into the small wood assembly section, while the large pieces move straight ahead, toward the rear of the building, where they meet the

# Ground Weather Signals

*A Discussion of the Panel Signal System as a Practical Method for Conveying Weather Data to Planes in Flight*

By HORACE R. BYERS

*Assistant Meteorologist, The United States Coast Guard*

AIR transport lines operating between two distant cities on non-stop schedules are becoming numerous in this country, where metropolitan areas are more widely scattered than in Europe. These have produced a new problem, namely that of communicating with the pilot en route.

When a schedule requires one or more stops along the way, communication is a simple matter, amounting to nothing more than getting in touch with the pilot when he stops at the various terminals along the route.

One of the chief hazards to be communicated to pilots is that of the weather ahead of them when, at the time of departure from the starting point, conditions are doubtful or dangerous. This is particularly important in an area where great differences in the weather can take place within a short distance. Such an area is found, for example, on the Pacific Coast and in California in particular. The first thing to be thought of in providing communication to the pilot is the radio. This is hardly any doubt but that all transport planes will be equipped with radio receiving sets in the future and will be in constant communication with ground stations while en route. However, at the present time radio engineers are only beginning with the problem of providing radio communication from an airplane to the ground and vice versa. There is so much to be taken into consideration—the shielding of the meters, the conservation of space, conservation and dependability of the operation, the location of sending stations and many other difficulties. In short, the

city of Los Angeles, not that Los Angeles has any worse weather than other parts of California. The reason for this is that there is no entrance to the Los Angeles area from the San Joaquin Valley, over which the stormy rain, least 4000 ft. above sea level. Therefore, when the Los Angeles area is clouded over, there is no way of entering the district for a plane intending to land without flying "blind" through the cloud or fog.

The Daniel Guggenheim Fund for the Promotion of Aeronautics, through its special Experimental Meteorological Service, described in the September 15 issue of *Aviation*, serves air transport companies with weather information over the San Francisco to Los Angeles airway. Communication cannot have been set up by the Fund at Fresno and Bakersfield, regular stops for all of the line's passenger lines except the Western Air Express planes, which make the trip without stopping. Matilda Airlines, Pacific Air Transport and Mutual Airlines Corporation planes receive last-minute weather reports from Bakersfield before they drop over the mountains into Los Angeles.

## Western Air Express Developing Radio

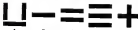
Western Air Express is now working on a radio communication system. But until this unit has been installed and put into operating condition, it will continue to be necessary to communicate with pilots in the air by some other method to warn them of changes in the weather, or to tell them as proceed when reports received at the time of departure from San Francisco indicated that the Los Angeles area was clouded over.

The Daniel Guggenheim Fund cooperated with the Western Air Express in devising a system. Provision was made for a system of ground signals, similar to the panel signals used by the United States Army Air Corps. These signals are employed at Bakersfield as signs of unfavorable or dangerous weather.

The panels consist of three strips of inconspicuous white cloth about two yards wide and 25 ft. long. These can be stretched out into various positions relative to each other and held into the ground by stakes. The positions of these panels indicate in the plain weather conditions south of the Tehachas Mountains.

When weather is unfavorable in Southern California and shows no sign of improvement before the time of departure, the pilot is ordered by by one Bakersfield to watch for the ground signals. About half an hour before the scheduled passage over Bakersfield the meteorologist at Los Angeles gathers weather information and orders the Bakersfield meteorologist, following discussion of the reports with officials of the transport company, to display one of the signals. If the weather is bad and shows no sign of improvement, a signal is displayed denoting the 1944 to come down at Bakersfield for reports. The

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This illustration shows the ground panel signals displayed at Bakersfield, Calif., to notify pilots of weather conditions at Fort Verde. "A" indicates a ceiling of over 2000 ft., one that is better, or an unlimited ceiling. "B" is the signal for an overcast sky with a ceiling from 1000 to 2000 ft. "C" indicates a smaller condition, but with a break around 2000 ft. "D" is the indication of the near end of a sky, but with the lowest sort of Fort Verde. "E" is the signal advising pilots to land for reports.

radio as a communication method with airplanes has not as yet reached that stage of perfection when it can be used continuously and with dependability.

Western Air Express, Inc., operates a non-stop service between San Francisco and Los Angeles, a distance of nearly 400 mi. Owing to the character of the area, there are different kinds of weather can be encountered en route. However, the only real danger is to be found in the vicin-

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## AIRPLANE DESCRIPTIONS

### Coffman Cabin Monoplane

A NEW cabin monoplane, adaptable to a wide variety of uses, is soon to be produced by the Coffman Aircraft Co., Channah, Okla. It is a three place plane of the extremely light type, and is powered with a 90 hp Curtiss OX-5 engine. Provision however has been made to install other power plants up to 150 hp.

By using a modified Clark Y airfoil section, a high rate of climb and low landing speed is obtained. The wing curve was developed by Stuart Coffman, designer of the plane, which is of conventional construction and has a span of 37 ft., a length of 23 ft. 6 in. and a height of 7 ft. 3 in. The weight of the plane empty is 1,910 lb.

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Front quarter view of the Coffman, OX-5 powered, three passenger cabin monoplane.

and the disposable load 680 lb. The first plane was flown in the air over the Oklahoma State Chamber of Commerce, and performed to the satisfaction of the audience.

The cabin is entered through doors in each side of the fuselage. Three upholstered seats are provided. The interior of the cabin is finished in leather and windows are provided at the front and on each side, affording excellent visibility for the pilot from his seat in the front. For instruction purposes an auxiliary seat may be rigged on the right side, next to the pilot and within reach of all controls. Passenger seats are placed at the extreme back of the cabin, and a luggage compartment is built into the fuselage behind it.

Stick control is employed, but instead of the stick being mounted on the cabin floor, it is extended from the roof. This arrangement is claimed by the designer to afford easier control for the pilot. It also reduces the number of shenanigans in the interior control system, without compromising the elevator controls.

The wing is of conventional construction with spars and ribs of wood. Wire is used for the internal drag bracing. Both the leading and trailing edges are of duralumin, and the entire structure is covered with fabric. The wing is supported by four streamlined and ribbed struts. The undercarriage has been designed to carry five times the gross weight of the plane. Shock absorbers are of the rubber cone type of special design.

The fuselage is constructed entirely of welded steel tubing with reinforcements at all important joints. Lugs are provided at the joints which contain the

ribs, and taper slightly to the tail. The engine mounting is of steel and is detachable. The main fuel tank is located in the forward portion of the cabin below the rear section floor and two auxiliary tanks are built into the wing, one in each panel. The radiator is suspended from the bottom of the fuselage slightly forward of the fire wall. All members of the tail group are constructed of welded steel tubing and covered with fabric.

### The "U. S. Flyer"

THE U. S. Airplane Co., of Chicago, is starting production on a three passenger, open cockpit biplane of conventional design powered with 110 hp. Anasazi engine. It is also adaptable to OX-5 and "Whisper" installations. The airplane is known as the "U. S. Flyer" and was designed by L. B. Coombs of Chicago.

The U. S. Flyer is a single bay type having a wing area of 35 ft. and an overall length of 34 ft. With an Anasazi engine, the high speed is 100 m.p.h., the cruising speed 80 m.p.h., and the landing speed 25 m.p.h. The rate of climb is 600 ft. per min. and the service ceiling 12,000 ft. The weight of the plane empty is 1,200 lb. and the useful load 300 lb.

In conformance with standardized practice, the fuselage is of the trussed type made of riveted welded web tubing, and is protected against corrosion by the Lacrol process. Bracing wires are checked off regularly in flight. The tail surfaces are of welded steel tubing with duralumin trusses. All controls to elevators, stabilizer, and ailerons are of the push and pull rod type used in conjunction with the Anasazi control units.

The rubber controls are of steel cable and the stabilizer is adjustable from the pilot's cockpit by means of a lever and quadrant. Cockpits are upholstered in green duralumin, the rear having a bucket seat for the pilot, and the front, a bench seat for two.



A four quarter view of the "U. S. Flyer", a three passenger, open cockpit biplane, powered with 110 hp. Anasazi engine.

our comfortably cushioned for the passengers. Shockless over fire wheels. Control movements are indicated for each cockpit, those for the pilot's are being indirectly lighted. The control system is of the steel stick and pedal type and may be used either single or dual. Visibility from either cockpit is complete and protection is furnished by windshields of ample proportions.

In designing the wings particular attention was given to strength, both in the wings themselves and the fittings for attaching them to the fuselage and center section. Solid spruce spars, ribs of spruce and collectively plywood, conventional members of solid spruce, Macawley ribs for internal bracing, and duralumin false ribs, trailing edges, and reinforcements combine with the extra size steel spar boxes, or struts, to make a wing of decided strength. Ailerons are double and are of simple construction to the wings. A Clark Y airfoil section is used. The color scheme is of two-toned Ralls Ray or gray. The center section, ailerons, elevator, and landing gear struts are of streamlined solid tubing, while Macawley streamlined steel tie-rod are used for external wing bracing. The landing gear is of the split axle type. Its lateral supports are of streamlined steel tubing, which also is used to surround the wheel steel axle struts. Rubber shock rods absorb the landing stress, and standard equipment includes streamlined wheels.

### The Ford-Stout 5-AT-1

THE Model 5-AT-1 all metal three-engine transport plane, which is now being produced at the plant of the Great Metal Airplane Co., Division of the Ford Motor Co., Detroit, is similar in general design to the planes of this type, which were introduced about three years ago, a description of which appeared in the July 1937 issue of AVIATION. The latest model, however, has a slightly greater wing area and is powered with three 400 hp. Pratt & Whitney "Wasp" engines. Production on both models is now to be resumed.

As in the case of the earlier model, the 5-AT-1 is a high wing monoplane of the thick wing type and is built entirely of duralumin. It has a span of 77 ft., 10 in. and a wing area of 835 sq. ft. The high speed is from 135 to 140 m.p.h., and the plane has maximum cruising speed of 115 m.p.h. Standard fuel capacity of 250 gal. gives the plane a cruising radius of 500 mi. Thirty-six gallons of oil is carried. Provision has been made to increase both fuel and oil capacity when long distance performance is required. The normal ceiling of the plane is 20,000 ft., the landing speed 62 m.p.h. and the gliding angle 9:7-1.

The new Ford monoplane weighs 7,400 lb. empty and can transport a useful load of 2,700 lb. Official tests



A front quarter view of the new Ford monoplane, model 5-AT-1, which is powered with three Pratt & Whitney "Wasp" engines.

have shown that the wing loading is 15 lb. per sq. ft., while the power loading is 30.5 lb. per hp. with one engine; 15.25 lb. per hp. with two engines, and 30.2 lb. per hp. with all three engines.

The plane has seats for sixteen persons, fourteen passengers, the pilot and a flight mechanic. In addition, it has a baggage compartment, which will accommodate all ordinary sized baggage of passengers. It also has a toilet and washroom.

From its first tests, Model 5-AT-1 showed unusual speed, flexibility, maneuverability and ease of control, and its designers are well satisfied with its performance.

### The Stewart Monoplane

TESTS are now underway and production is soon to be started by the W. F. Stewart Co., Grand Blanc, Mich., on a new general purpose monoplane. The plane is being tested by John L. Frost, the designer. At present the company is engaged in the manufacture of accessible bodies and production of the new plane will mark its entry into the aviation industry.

The Stewart monoplane is a four place, open cockpit, type of wood construction with composite wing. It is powered with a Curtiss OX-5 engine. It has a wing area of 38 ft., 6 in., a length of 26 ft. and a height of 6 ft., 10 in. The weight empty is 1,300 lb. and the weight loaded 2,225 lb. According to the performance figures furnished by the manufacturer, the plane attained a high speed of 105 m.p.h., and has a cruising speed of 85 m.p.h. and a landing speed of 43 m.p.h. The ceiling is placed at 15,000 ft.

The wing, which is tapered to plan form and section, is built in three parts with the center section containing two



Rear quarter view of the Stewart monoplane. This is a four passenger, open cockpit plane with a full fuselage engine. It is powered with an OX-5 engine.

36 gal. fuel tanks and built into the fuselage. The panels are attached to the center section by top bolts. Two box beams, one on top of spruce beams at top and bottom, and two ply monogony vaneer sides, are arranged in the wing structure. The direction of the grain in each of the adjacent ply is at right angles to that of the other. Plywood bulkheads are placed inside the box spars at each station. Warren truss ribs of the web and cut strip type are used. The finished wing structure is finished and is covered with monogony plywood.

Spruce is also used in the construction of the fuselage framework which is braced by plywood bulkheads and gusset plates. This is protected by Lamin and is covered with three ply monogony vaneer. Both the wing and the fuselage are finished with light monogony stain and are smooth of finish.

Side by side seating arrangement is provided. Dual controls are installed in the forward cockpit, making the plane particularly adaptable for instruction work. The detachable engine mounting is constructed of welded steel tubing, and the split type landing gear is built of stainless steel. The landing gear is a high truss chrome molybdenum steel tube axle. The tail end is built of wood and, like the landing gear, employs a rubber shock cord.

All control surfaces are of spruce and plywood construction and are covered with fabric. The rudder is balanced, and the stabilizer is adjustable in flight. The vertical fin is adjustable on the ground. Cabins are used throughout the control system.











## October Was Banner Month at Oakland Field

OAKLAND, CALIF.—New marks were established at Oakland Municipal Airport during the month of October, according to reports from the board of port commissioners and agencies who make use of the field.

Boeing Air Transport carried the heaviest single load of mail, 725 lb., from Oakland to Chicago; the airport played host to the greatest number of planes in an hour, and 71 planes are now operating regularly at the field; and the airport gave operations revenue at \$2004.36 for the month of October was greater than any other. Last October October landed 3,252, 3,215 passengers were carried, and 47,452 single flights were made.

Boeing International's new Western Air Service Douglas F-10 is a new passenger jet, a travel from Oakland to Los Angeles in 2 hr. 8 min., an average speed of 450 m.p.h., on one section during the period. It was of course, aided by a tailwind. An outbreak of Pacific Air Transport also set a new record for mail placed over this same route, but only about at Fresno and Bakersfield. His time, including stops, was 2 hr. 10 min.

For the last 18 months of this year the airport figures are as follows: October, 30,218 passengers carried, 35,572, single flights, 4,331, and gross revenue, \$27,322.

## Superior Airport Now Ready for Pilots' Use

SUPERIOR, WIS.—With the transfer of the location of the airport from the Coudage airport, near Fredrick, to Douglas County by Government representatives, it is anticipated that the airport is ready for use and first pilots are advised to make use of the field.

At the present time there are two companies operating at the airport, the Superior Airways Co., owned and operated by A. J. Hite and the Wisconsin Airways Co., owned and operated by L. A. Hoffmann.

## New Orleans Gets Bessco

NEW ORLEANS, LA.—In connection with the recent opening of the Monroe Airways, Inc., field and the general expansion of the developments in the Orleans and vicinity, an airport license has been awarded on the roof of the Greater New Orleans Hotel. Known as the "Zing Airport," it is the regular type of one main building, commonly used along the northern coast. Mounted on a steel tower that has been erected on the roof of the hotel, it is 20 ft. above the street.

## Airport Opened at Enid

ENID, OKLA.—The new airport, four and one-half miles east of the city is now in operation. Capt. Hugh Andrew has been assigned to the field. The Enid Field Authority is a 6-ft. measure.

## Start Air Map Of Coast City

LOS ANGELES, CALIF.—Work has been started on an aerial photographic map of the entire downtown business district of Los Angeles. The Bureau of Field Work of the city has agreed to pay for all materials used in the work, while Louis B. Buehler, C. L. Lee, and Stuart G. Tucker, members of the 115th Ordnance Squadron, California National Guard Air Service, have been assigned to special duty by the Los Angeles city officials in connection with preparing the airport map.

## Black & Bigelow, Inc. Gets Camden Contract

CAMDEN, N. J.—Contract for the design, as well as for the supervision of construction work, of the Camden Airport, was awarded to Black & Bigelow, Inc., a subsidiary of New York City. Available Black, president of the company, will be in charge of the design work, and supervision will be under the direction of Mr. J. C. Wierzbowski.

The airport, which is situated on the Philadelphia-Atlantic City Highway and is a half mile from the Philadelphia City Hall, is composed of 126 acres, and is owned by Central Airport, an organization owned by Messrs. C. V. Ladd, C. M. Kory, Harold P. Feltus, N. S. Ladd, and other leaders in the aviation industry.

## Gulf Lines to Operate St. Tammany Airways

NEW ORLEANS, LA.—The acquisition of a new company in the city of St. Tammany Gulf Airways, Inc., has been announced. The new company will be owned and operated by Gulf Lines. Headquarters will be in New Orleans.

No changes are being contemplated, according to reports, in the several companies are being prepared. A line is being planned in Florida to connect with the Gulf Airlines in the Central and vicinity. The new company will also operate the Atlantic-Florida-New Orleans and the New Orleans-Louisville air routes.

## Monmouth Field in Operation

MONMOUTH, PA.—A 36-acre airport has been developed and is now being operated by the Monmouth Aero Corp. Capt. H. H. Hite is in charge of the field. The field is a 6-ft. measure. The company extends an invitation to all pilots to visit the airport. All aircraft on arrival to the airport will be given the best service.

## Building Hangars At Atlantic City

Materials for Structures Obtained from Rascal Convention Hall

ATLANTIC CITY, N. J.—Erection of two hangars at the airport here has been started. The hangars are being erected on the property owned by the Atlantic City Rascal Convention Hall. The hangars are being erected on the property owned by the Atlantic City Rascal Convention Hall. The hangars are being erected on the property owned by the Atlantic City Rascal Convention Hall.

Already one of the steel hangars is nearly completed and the second one is in place for the other. The hangars are made of steel girders and steel sheet piling over reinforced concrete foundations. Construction of both is expected shortly.

The hangars will be 112 ft. by 126 ft. with a clearance of 20 ft. and will provide for the storage of aircraft and other equipment. The hangars will be 112 ft. by 126 ft. with a clearance of 20 ft. and will provide for the storage of aircraft and other equipment.

With the completion of the two new hangars and the second one is in place for the other. The hangars are made of steel girders and steel sheet piling over reinforced concrete foundations. Construction of both is expected shortly.

Following completion of the field, it is planned to operate the field as a general airport, for the length to be 2,500, 2,800 and 2,200 ft., respectively, and 150 ft. in width.

## Wichita Radio Base Opened

WICHITA, KAN.—The new \$50,000 Government radio station at Wichita, Kansas, is now in operation. The station is owned and operated by the Federal Bureau of Investigation. The station is owned and operated by the Federal Bureau of Investigation. The station is owned and operated by the Federal Bureau of Investigation.

## Lighting Contract to Jacksonville

KALAMAZOO, MICH.—The Jackson County Council of Chicago has been awarded the contract for installation of new lights and an automatic field house on the property owned by the Jackson County Council of Chicago. The contract is for the installation of new lights and an automatic field house on the property owned by the Jackson County Council of Chicago.

## Pobjoy Engine Passes Tests

General Power Plant, Weighing 115 lb., Develops 60 hp.

LONDON, ENGLAND.—A new seven-cylinder air-cooled radial engine of 60 hp., maximum, weighing only 115 lb., has been tested. The engine is being tested by the British Air Ministry official test of 100 hp. and may now be used for general aviation. The engine is being tested by the British Air Ministry official test of 100 hp. and may now be used for general aviation.

## Beard's Slapper Flies Over

The Pobjoy engine has been tested and shown to be a very good engine. The engine is being tested by the British Air Ministry official test of 100 hp. and may now be used for general aviation. The engine is being tested by the British Air Ministry official test of 100 hp. and may now be used for general aviation.

## South Carolina Employed

Our South Carolina member nation to the company of a new aircraft model named on the bank side of the aircraft. An aircraft model named on the bank side of the aircraft. An aircraft model named on the bank side of the aircraft.

## His Split Creek Case

The truck-truck test is a light alloy 10 ft. in the place of the cylinder and supports the crankshaft in two roller bearings. A level gear to the crankshaft is the crankshaft in two roller bearings.

## Lighting Contract to Jacksonville

KALAMAZOO, MICH.—The Jackson County Council of Chicago has been awarded the contract for installation of new lights and an automatic field house on the property owned by the Jackson County Council of Chicago. The contract is for the installation of new lights and an automatic field house on the property owned by the Jackson County Council of Chicago.

## FOREIGN ACTIVITIES

### Game Hunters Use Amphibian

TORONTO, CANADA.—The value of amphibious planes in the pursuit of big game has been recognized by Canadian hunters who use the small to spot moose and deer, and then descend to them. This transport the left bank of the St. Lawrence River. After the quarry is located, the plane is landed on the surface of a nearby pond, and the hunters are then proceeded through the brush to stalk and kill the game.

### Under the After-charge, which can be used for a number of purposes.

A small pump is attached to the bottom of the front section of the aircraft, and is used to pump water into a covering pump and two oil filters. Both filters may be removed for cleaning without descending the plane. The covering pump is used to pump the water into the engine. The covering pump is used to pump the water into the engine.

### R. A. F. Show Set for July

LONDON, ENGLAND.—The Tenth Royal Air Force Display has been scheduled at Farnborough, Saturday, July 11, 1958. This date was selected in order to allow visits to the International Aero Exhibition at Farnborough. The Exhibition is scheduled for July 11.

### Spartan Jets Non-Stop

LONDON, ENGLAND.—H. W. R. Herring, with four Col. L. A. Stange as passenger, flew from a C-119 to the base of the Spartan Jets Non-Stop. The flight was made from the base of the Spartan Jets Non-Stop.

### Dominion's New Clubs Total 15

MONTREAL, CANADA.—It is reported that 15 new flying clubs have been organized in the Dominion. The clubs are organized in the Dominion. The clubs are organized in the Dominion.

### Grand Will Cross Again

BERLIN, GERMANY.—Dr. Hugo Eckhardt, Chief Engineer of the German Air Force, has announced that the German Air Force will be able to cross the Atlantic with the problem of fuel supply is satisfactorily solved.

### Australia Subsidizes Two Transport Lines

SYDNEY, AUSTRALIA.—The Commonwealth Government announces that it has agreed to subsidize two air transport companies who have offered to provide a new service to more of the isolated areas of the Commonwealth.

A subsidy of £11,500 (approximately \$23,000), to be paid during the next three years, has been granted the Queensland and Northern Territory Aerial Services Ltd. The subsidy will be given to the Queensland and Northern Territory Aerial Services Ltd. The subsidy will be given to the Queensland and Northern Territory Aerial Services Ltd.

### Under the After-charge, which can be used for a number of purposes.

A small pump is attached to the bottom of the front section of the aircraft, and is used to pump water into a covering pump and two oil filters. Both filters may be removed for cleaning without descending the plane. The covering pump is used to pump the water into the engine. The covering pump is used to pump the water into the engine.

# THE BUYER'S LOG BOOK

## Novalux Twin Floodlight

ONE OF the recent developments of the General Electric Co., Schenectady, N. Y., is the Novalux twin floodlight for its illumination of airports. This unit has a lens of development of more than 10 deg. in the horizontal plane and only 6 deg. in the vertical. Thus the necessary illumination is provided with a minimum of glare. The floodlight reflects two independent blanda beams of either the 5 or 10 kw size and is inherently suitable for remote control.

The Novalux twin floodlight is 5 ft. 6 1/2 in. wide, 3 ft. 4 in. deep and 6 ft. 3 1/2 in. high. The light source is 4 ft. above the surface upon which the light is measured. The net weight is 750 lb. and the shipping weight 3000 lb. The reflecting surface consists of two 24 in. parallel glass mirrors and the frame of the housing is enclosed by convex glass lenses. Large hinged doors are provided on each side of the housing and afford easy access to the lamps.

Mounted to the rear of the mirror is a central panel fitted with controls and a more delay relay for the automatic connection of the lamps at reduced voltage when they are first lighted. This provision is made be-

## Brunner Air Compressor

MANY AIRPORTS in various parts of the country are including in their equipment air compressors for tire inflation and spray gun operation. A unit especially adapted to this type of service is included in the product line of the Brunner Manufacturing Co., Clevel., N. Y., makers of automotive air compressors.

The Model 854 compressed air unit incorporates a two cylinder 3 1/2 by 3 in. divided head air-cooled compressor and will duplicate 8.2 cu. ft. of air per min. Forced-air construction is employed in the tank, compressor and motor bases and slide rails and the assembly is rigid and strong. A 2 hp motor is furnished.

The tank is 16 by 20 in. in size and has a capacity of 33 gal. and a working pressure of 175 lb. The entire



The Model 854 Brunner Air Compressor

unit is 6 ft., 2 in. long, 1 ft., 10 1/2 in. wide and 3 ft., 3 1/2 in. high. The net weight is 607 lb. and the shipping weight, 772 lb.

A complete line of air compressors and equipment is manufactured by the company. Automatic controllers, valves, accessories, sprayers and other pneumatic tools are included. A booklet describing this equipment may be obtained from the manufacturer.

## Field Marker Lights

MULTIPLE BOUNDARY lights with clear globes, approach lights having green globes, and obstruction lights with red globes are included in the airport and floodlighting equipment manufactured by the Westinghouse Electric & Manufacturing Co. and are available at the commercial lighting section of the company in South Bend, Ind.

Both multiple and series marker lights are made of cast aluminum and are moisture proof regardless of the position in which they are installed. The globe is held firmly between two felt gaskets, one on the housing and the other on the globe protecting or globe holding guard ring. Multiple lights are tapped for 3/16 in. pipe and series type for 1/2 in. pipe.

Westinghouse lock type marker lights may be supplied with or without globe protecting guards. Hacking rings and guards are provided with a special screw wrench which is necessary to detach the globes. For multiple boundary lights clear globes are used and for series boundary lights diffusing globes are employed. These lights are made in a number of sizes to suit the requirements of the purchaser. Globes and bodies can be purchased separately.

## Leather Flying Suit

FOR THOSE: a leather flying suit, the Army Signal No. 33 has been stocked by the Garvin-Leader Specialty Leather Co., South Street and Cedar Street, Trenton, N. J. This suit was especially designed for the Army and is now being offered for commercial use. It is made in sizes from 36 to 48.

The No. 33 flying suit is made from carefully selected dark brown calf skin leather, which is full chrome tanned and retains its original softness and flexibility, even though subjected to the most adverse weather conditions. The suit is hand-stitched with virgin washed wool, dyed black. The lining is woven cotton of wool fibers, creased face and back to give a full "lofty" finish. A soft warm-colored collar of South American Beaver is also provided.

A five inch heavy cowhide leather belt which straps down in front is also furnished and is constructed to provide a secure rigid and comfortable posture and to afford maximum warmth. Zipper fasteners are used in front and on the sleeves and legs. The below pockets on the right breast and each leg are so placed as to be out of the way of parachute straps. Worn-out knitted undersuits are included in the sleeves.

The garment is double stitched throughout with pure silk and a special quilt stitch is employed on the back and legs. Buckles and zippers are of non-magnetic metal. Operators are provided below the belt to reach the leg pockets of the inner garment.

A complete line of winter and summer flying suits is included in the products of the company. Helmets, gloves, moccasins, coats, gas masks and wind suits are also manufactured by the company.

## Durabil Airport Signs

TWO AND three color airport signs, of 20 sign size, 24 in. in diameter, are now stocked by the Johnson Aircraft & Supply Co., Dayton, O. The two color signs have airport yellow background and black picture painted letters. All types are mounted on 1 1/2 in. angle iron studs, six feet long.

Two Durabil signs are now offered by the company and are furnished complete with stakes and bolts ready to set up. The ten styles are as follows: No. 1, "Flyway-World's Greatest Sport"; No. 2, "Reasonable Flying—Reasonable Rates"; No. 3, "Landed Plane—Landed Pilot—100% Safe"; No. 4, "The Sky—The Highway of the Future"; No. 5, "Pier Parking" (with direction indicating hand); No. 6, "No Parking Please"; No. 7, "No Smoking in Hangars or Near Planes"; No. 8, "You will commonly fly—We will not"; No. 9, "DANGER—No Law Flying Airplanes—Do not cross flying field"; and No. 10, "DANGER—Do not touch propellers".

## Bonney Ignition Wrenches

A NEW set of wrenches, known as Ignition Set No. 18, has been announced by the Bonney Forge & Tool Works of Allentown, Pa. The set contains 10 wrenches, suitable for use in ignition work in the various electrical systems, such as Auto-Lite, Delco, Bosch, Westinghouse, South East, Barry Spindler, Westinghouse and others.

The strength obtained through the use of Chrome Vanadium Steel has enabled these wrenches to be larger than light and has made possible a number of innovations in the standard design developed by the Bonney Ignition set. Every wrench is backed by the usual Bonney guarantee.

## Ground Weather Signals

(Continued from Page 1262)

meteorologist at Los Angeles is in almost constant telephone communication with stations surrounding Los Angeles and it is a passion to observe the sun at Bakersfield to make any possible changes in the signals.

The signals have been used on several occasions and the pilots have been full of praise for their usefulness.

In most instances the pilots have been referred to land at Bakersfield for last minute reports before proceeding over the mountains. In a good many cases the meteorologist was told the pilot precisely what course to follow in order to get through with the least difficulty. This is made possible by the dense network of weather stations which the Guggenheim Trust has established.

While the system is not so effective in a good radio, its benefits are in its simplicity and the small cost. For night flying these panels can be lighted. The signals are arranged in such a way so that they can be read from any angle. A system of panels can also be employed at various points along the route for communicating information to the pilot other than weather conditions. When pilots are having to make connections with others to which passengers or mail are to be transferred, the pilots can be informed by ground signals whether or not the planes with which they are to connect are going to be on time.

## Alexander Production

(Continued from Page 1262)

ring, which, when completed in the small wood assembly, move to the left and are assembled into the wing framework. The wing frames are picked up by the trolley system and carried out of the building to the launch department for treatment.

On their return the wing frames stop in the covering department, which is located between the wing rig and



A wing frame on the trolley system at the plant of Alexander Aircraft Co.

the fuselage assembly section, and after being covered in the "dope" room. When they are returned, they are carried to the rear of the final assembly hall at the rear of the building.

The fuselage assemblies, too, move to the left into the



Front view of the Novalux twin floodlight recently developed by the General Electric Co.

# The SENIOR AIRSEDAN



## EIGHT PLACE—DUAL CONTROL

### Specifications

Wing Span	3,000 Sq. Ft.
Wing Area	14 ft.
Wing Area	440 sq. ft.
Length	31 ft. 6 in.
Wing Load	8,000 lbs.
Useful Capacity	2 Pilots, 4 Passengers

### Performance

High Speed (Cruising)	131 mph
Cruising Speed	110 mph
Landing Speed	41 mph

### Power Plant

Engine	Wasp
Horsepower	427
Fuel Capacity	100 gals.
Oil Capacity	10 gals.

### Equipment

Radio, Radio, Metal Pitot, Compass, Air Speed Indicator, Strapping Light, Telemeter, Altimeter, Clock, Fire Extinguisher, Fuel, Oil, Pressure, and Oil Temperature Gauges, Air Gauge, Thrustle, Starter and Fuel Valve, Exhaust Manifold, Cabin Heater

**Price, \$18,500**

Factory new field, Marysville, Mich.

**Buhl Aircraft Company**  
**MARYSVILLE, MICHIGAN**

TRADE YOU for motorcars AVIATION

covering department, and from there go by trolley to the dope room for lacquering, thence into the hangar assembly room again for the installation of the engine and landing gear. Then, they go once more out of the factory, this time to the paint room, and, on return, move to the final assembly line.

The over-head trolley system might be likened to a tree. The trunk is the straight line of tracks, which join the main factory with the other buildings. The main line is the branches from the main line to the separate outside buildings, and the branches are the segments that pass this way and that in the main building.

The casual observer might have difficulty in following the production line, but the work follows just as orderly a path as any "assembly-line" production system. Considering the various operations, some less hazardous than



A diagram showing the arrangement of the main building at the factory of Alexander Aircraft Co. The heavy black lines indicate the overhead trolley system, while the arrows show the movement of the materials in reaching the final assembly line.

others in reference to fire and explosion, the Alexander production line, though somewhat devious, is orderly. There is no confusion at any point and the various materials, the several sub-assemblies and the accessories reach their proper stations so fast that there is no delay at the point of final assembly.

The over-head trolley system to the outside buildings is sufficient to provide a complete movement of the materials receiving their attention in paint, or their entry into the dope room for lacquering. For example, the track that leads into the dope room passes directly over the huge vat that contains 1000 gal. of the fluid. Without being removed from the trolley, the material may be lowered into the vat, then pulled up, and the carriage switched to another track that carries the material to an outside point for drying—still suspended from the trolley. When the material is dry, the carriage is shifted to the main line again for the journey back to the main building.

In the "dope" room, the track enters at one side. The wings, on their carriages, move into the room, receive their several coats of lacquer without being removed from the hooks which suspend them from the trolley carriage, as they enter a circle of the room, then move out the other end of the building, go into the main line trolley and on to the main building.

Similar systems apply in the paint room where fuselages and metal work are finished.

If we were to consider the trolley system, with its various runways, as the production line, then it could be said that the Alexander production line is 7,000 ft. long.

## The Air Is Yours To Explore



CENTURIES past, the sea was the means of adventure, exploration and trade. Now it is the boundless sky, and history looks on you through the airplane—on the short cut to East, Europe, Africa, Asia and others were the pioneers. Look back to our Columbus, but now the world opens another horizon, a horizon, a world and an American Vespene.

But the opportunities of the air are far greater. The ether does not possess a horizon! Who will be our DeSoto, our Ponce de Leon, our Lewis and Clark? New fields apleady await mind and

enthusiasm. Fame and fortune are unlimited on the sea of the Air—its yours to explore.

But personal ambition is not sufficient; luxury and physical strength will have but little bearing in these modern days of transportation. A casual duster's western on the high sea, nor does man dare to fly in any but a rugged craft—on the high side of the sea, there is no room to roam—in quick take-off, in flight or in landing. There's nothing in the COMMAND-AIRE and along with it is DeSoto and Ponce de Leon. A ship of luxury in Appearance and in Performance.

Approved by the  
No. 31

**COMMAND-AIRE, Inc.**  
**Little Rock**

See Model America description for the PHYLAX AUTOMATIC FREE EXTINGUISHERS for airplane

TRADE YOU for motorcars AVIATION







## Heywood Starter Adds Safety and Convenience to Air Travel

**S**AFETY is acknowledged the foremost factor in the further development of aircraft.

In establishing aircraft reliability and safety, numerous contests and spectacular flights have been made. Editorially, the nation is endeavoring to establish confidence in the safety of aeroplanes to the end that hazards of flying are gradually being eliminated.

The Heywood self-starter for aircraft motors has done much to eliminate risk to pilots and passengers. Fatalities due to starting motors by means of swinging the propeller are now a thing of the past. Modern aircraft are equipped with Heywood Starters, permitting instant starting by means of simply pulling the starter trigger on the dash.

Pilots and passengers and even student pilots no longer fear the motor going dead in mid-air, for in a twinkling a positive new start is assured by a simple touching of the button.

Simultaneous with pulling the starter trigger, compressed air forces a carburated mixture into each cylinder in firing order with sufficient pressure to turn the motor over, causing positive ignition and consequent starting.

Manufacturers and pilots are universal in their acceptance of the Heywood Starter, and, recognizing its necessity, are prepared to equip aircraft, new or old, with this unfailingly positive starting device.

**The Heywood Starter Corp.**  
6547 St. Paul Avenue, Detroit

the need to make a trip by air. This is supplemented by the publicity department, but the personal element is the most important. It has been found that when a person makes a trip by air he becomes an active booster for such means of transport. He tells his friends about the trip and urges them to try it. The result is we are building up a constantly increasing number of co-efficient traffic boosters.

It has been our experience that the men or women making a trip by air expects more comfort and attention than of the same journey were being made by train. In fact, they should be granted these, because the airplane



Servicing out of the three-inged Fokker seaplanes operated by Western Air Express.

is in the class of an "eaten fire" train. It gives tremendous speed and saves time, also the time charged for the trip is greater than that for surface transportation.

Actually the additional time, even at this rate is the velocity of aerial passenger transport, is neither excessive nor excessive. Department of Commerce figures indicate it costs eight cents a mile for ocean travel, 6.6 cents per mile for Pullman train travel, and the average for air travel is only 10 cents per mile. These figures, of course, are for the best services.

Our airport at Van Nuys, Los Angeles, has a small but splendid passenger trip. Passengers are transported to and from the field in limousine cars. They are driven direct to the door of the depot, walk through the waiting room and then under a covered archway direct to the door of the passenger plane. In the hottest or coldest weather they are never exposed to the elements. The depot is of Spanish type of architecture and the furnishings are appropriate. Too few airports at this time have adequate accommodations for passengers, but these will come as air passenger travel develops.

Our passenger planes are luxuriously furnished, but even that luxury is not sufficient to really satisfy the ground-day air traveler. The trip from Los Angeles to San Francisco takes only three hours, and it is a journey of marked scenic beauty, but we have found passengers appreciating the surprise of having a light lunch served to them during the flight. Of course, no change is made for the landman. Also they are supplied with the latest daily newspapers and the second pilot cradles with the passengers and guests out places of interest as they come into view.

Getting a passenger interested in the scenery will encourage any feeling of interest that may accompany the first trip in the air and with this feeling of fear gone the trip becomes truly enjoyable. Then the passenger, particularly if it is his first flight, becomes an ardent

## A Winter Flying Suit of Quality

3 INCH BELT

Molokini cloth, waterproof lined with sheepskin, fleece 3/4 to 9/8, with duck. Ties hookless fasteners on front and wrist, wind shield gaskets on cables. Collar of extra fine fur.

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## Dependable Steel Doors

Let Truscon Engineers solve your hangar door problems. Truscon Engineers Hangar Doors meet every requirement, providing such advantages as maximum clear air, clear open without obstruction, operation on low water content of very low hanging, construction of flat steel, plus ductile, and various combinations.

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COPPER ALLOY STEEL  
**AIRPLANE HANGAR DOORS**

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**T**HERE is just one way that any aeronautical project can be made to pay, and that is keep a-bustling!

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At the same time, however, it is essential that the equipment be kept up to the highest point of efficiency, always ready to go and dependable when needed.

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The OX-8 motor can be made as reliable as anything heretofore on the market in the way of motors.

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A Millerized OX-8 represents the last word in reliability, efficiency and economy. Thousands of OX owners are now reaping the harvest from this knowledge.

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If you are not fully acquainted with the many improvements possible through the use of our products on the OX, then write or wire any of our factory representatives, or to us direct for full information on Miller airplane products.

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booster. It is good psychology—this paying a little unexpected attention to the passenger—but it brings more business.

For the foregoing reasons Western Air Express to date has been successful. Hard work, constant attention to details, consistent pointing on the public and thorough cooperation between all departments, will continue to insure success. Soon, by these combined factors of progress, Western Air Express will extend its facilities outward and offer its services to many more people.

## Financing Wholesale and Retail Sales

(Continued from page 1589)

In spite of this fact Mr. Coffey has ascertained that other finance companies are still almost unanimous in refusing to admit the possibility of such financing and it is quite apparent that other aircraft manufacturers throughout the country must approach their local finance companies and sell them the idea of aircraft financing just as the Aero Corporation succeeded in doing in Los Angeles.

In the opinion of Mr. Coffey this financing of aircraft is an hoped development as was the financing of locomotives for transportation lines, or of public improvements for municipalities, and it is his prediction that within a very short while all finance companies will have an aircraft department just as they now have automobile, radio, and electrical contracting departments.

In this connection there is one note of warning to be sounded to aircraft dealers and finance companies undertaking the time sales program. Automobile dealers several years ago caused a serious slump in the automotive industry by selling thousands of cars on time payment plans to financially irresponsible persons. When it later became necessary to repossess these cars the dealers were in many cases ruined out of business and some of the largest automobile manufacturers were very nearly bankrupted. The aircraft industry has closely followed the lead of the automotive industry in its development and there is every reason to fear an over-enthusiasm for financing of aircraft which might result disastrously for the entire aircraft industry. The only safe procedure would seem to be that of strict investigation of every prospective time purchaser before making the sale.

### Distributors Should Be Financed Liberally

Although some factories have tried financing time sales this seems impractical in the face of the production problems which face the factories for solution. The logical development is probably for all aircraft distributors to be adequately financed by local companies in order that they can stock up on airplanes as the market may require, having these available for immediate delivery and at the same time providing a reserve between the factory and the final purchaser which will make it possible to smooth out the production schedules and lower the price of airplanes.

Since 80 to 90 per cent of all automobiles are sold on time it seems reasonable that the aircraft industry should not eventually make the same blunder, for there is no comparison in the aircraft industry which permanently removes it from the ranks of accepted business methods.

When the time does come, as it promises to come soon, that the majority of all airplane sales will be made under a time payment plan it is evident that the dealer with no such plan in effect stands certain to lose business.

While there does not appear to be any possibility of an overproduction of aircraft for some years to come, it

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Model C      Model H

*Dependable Motor Heat Indicators*

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THE MOTOMETER COMPANY, INC. 111 1/2 WILBUR AVE., LONG ISLAND CITY, NEW YORK

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There's just one way to be sure of it  
Curry your hangar with you  
**THE FORRESTER HANGAR  
Portable by Plane**

Shelter your plane completely, with working space all around.

Will stand in any weather.

Builds, it will slip over the cockpit—and let down at the "Zero Type" or height 110 ft., complete with stairs, gas and collapse pins.

Built of "Jesse Chisel" is in FIBREGLASS and WATER TIGHT.

Will not crack, chafe or break in storm or flood.

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Exclusive Distributors:

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## GRUSS AERO STRUT Shock Absorbers

Always in the  
AIR  
Yet on the  
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A 35 watt compressed air cushioned strut of stainless aluminum all landing shock and also eliminates all air when loading.

A positive hydraulic shock absorbing strut. These struts make all landing soft and short and assure protection in all parts of the trip.

**Safety, Economy and Efficiency**

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## To Pass the TRANSPORT PILOT'S EXAMINATION

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A book has been prepared which thoroughly covers the examination for any grade of license in these subjects, and if the candidate will spend a few hours studying it no difficulty will be experienced.

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does seem that the limit of each sale is rapidly being reached and it is more than probable that widespread adoption of these payment selling will be necessary to realize the increased volume of aircraft to be made available in 1939. In this connection it would seem that the large, and established dealers will, through the cooperation of finance companies, be able to expand and capitalize on the great experience now taking place, while the dealer with little financial background, unable to obtain a financing plan, will be forced to drop out of the business. It is unlikely that any concern, no matter how prosperous it may have been in the past, will have been able to save enough money from earnings to make the necessary expansion to meet next year's requirements for the rapidly mounting sales and service of aircraft, without calling on outside capital.

It seems, therefore, that the immediate problem of the dealers and distributors everywhere, is to obtain the financial backing of reputable finance companies and to push the time sales plan for aircraft marketing.

### The New N.A.C.A. Low Drag Cowling

(Continued from page 1557)

best conventional type with a large spinner. A still greater difference is to be expected in the case of all tailfinnings or a nacelle, the tests on which are now under way.

Rough calculations show that the power required to drive an average conventional Whitworth engine on a ship airplane at an maximum horizontal speed would be reduced by from 15 to 20 per cent, by the use of the new N. A. C. A. complete cowling in place of the best present conventional cowling. For three-engine transports with two wing engines the decrease in power required under similar conditions would be from 20 to 25 per cent, and for machines with single open cockpit. Savings as much as 20 to 30 per cent.

If the full engine power were used with the N. A. C. A. cowling, the maximum horizontal speed would be increased by from five to ten miles per hour for the average cabin airplane, somewhat more for the three-engine machines, and as much as 30 m.p.h. for small open cockpit planes such as single-seater fighters.

Inasmuch as the drag is less with the N. A. C. A. cowling, the power available for climbing is greater, and the rate of climb and the ceiling will be increased. The fuel consumption will also be reduced, the amount depending on the speed of flight. If the same cruising speed is maintained, as with the old cowling, the decrease in fuel consumption will be approximately proportional to the decrease in power required. On the other hand, if, as is more likely the case, the same engine power will be used in order to cruise at an increased speed, the number of miles obtained per gallon will be increased in proportion to the increase in speed. An increase in range will also be obtained, which is proportional to the increase in the miles down per gallon.

It is believed that the improved performance with the new cowling makes the air-cooled radial engine a far better than the water-cooled engine in the matter of drag, except in the case of pure racing planes on which wing radiators may be used.

The results of the wind tunnel tests were so promising that it was decided to check them in flight. The Army kindly loaned an AT-5A (Curtiss Hawk) with Whitworth I-5 engine for advanced training purposes) for the tests. The new N. A. C. A. complete cowling was then adapted to the plane by the Flight Operations Section of the laboratory, which had also constructed all of the cowling

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that goal. We shall be glad to furnish you with  
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**THE BEETLE**

for the wind tunnel investigation, and the tests were  
carried out by the chief test pilot, Thomas Campbell, and  
his two assistants, Henry McAvoy and Christopher  
The best of the standard Army AT-3A planes was taken  
from the line and a direct comparison was made between  
it and the one with the complete cowling, both being  
flown at the same time. Each test point was checked  
several times by each of the three pilots.

The plane with the new D. A. C. A. cowling had a  
maximum horizontal speed at sea level of 127 m.p.h.,  
as compared with 115 m.p.h. for the standard AT-3A,  
both being armed with the same engine installation.  
This represents a gain of 10 m.p.h. due to the new cowling.  
The reduction of engine drag is probably directly



The D. A. C. A. complete cowling as it was originally  
designed.

responsible for about 13 or 14 m.p.h. of this gain, the rest  
being due to the decrease in induced drag and the increase  
in propeller efficiency at the higher speed.

All of the subjects upon the plane with the new  
cowling smoother to fly and better in maneuvering the  
controls than the standard plane. No doubt this can be  
attributed to the smoother air flow over the fuselage and  
upper portion of the tail surfaces.

The pilots also reported that with this airplane the new  
cowling did not alter the range of vision in any useful  
field.

The complete cowling, of course, can offer relative  
view can be obtained between the cylinders. Undoubtedly,  
there seems to be a great difference of opinion  
regarding the usefulness of the vision which can be ob-  
tained between the cylinders, some pilots maintaining  
that it is essential in the case of some planes, such as  
fighters, and others believing that it is never used to an  
appreciable extent. It undoubtedly depends to some extent  
on the contour of the engine and the amount of  
space between the cylinders. If the complete cowling  
could be given use, as in these first tests seem to indi-  
cate, there may be a tendency toward the development  
of more compact engines having a smaller overall  
diameter.

Other engine developments which would improve the  
effectiveness of this type of cowling are the placing of  
all accessories, especially the magneto, in the rear (this  
is of course now being done in many power plants), and  
the provision of greater distance between the plane of  
the cylinders and the propeller so that a better shaped  
nose can be had.

The new D. A. C. A. cowling, being simple and smooth  
in form, is easily constructed. The nose piece or hood  
used in both the wind tunnel and flight tests was built

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up into a complete ring which was inherently stiff and strong without bracing. It could be easily removed, but it was first necessary to remove the propeller. To avoid this in practice, it would probably be advisable to make the nose piece in two or three quickly detachable sections. When the nose piece is removed the small cowling over the engine is similar to conventional types, and most parts of the engine requiring frequent attention can be easily reached. No difficulties of maintenance occurred during the many hours of wind tunnel running or in the flight tests.

In manufacture, the complete cowling would probably cost no more than a conventional cowling without apron, except for the nose piece. Since a sprayer is not required, it would not kink if any more than the con-



One of the conventional forms of cowlings used on cabin monoplane, which was used in the previous research model of the N. A. C. A.

ventional types using a large sprayer. The weight of the nose ring used on the AT-5A, part of which was made of 1-16 in. thick aluminum for convenience in working, was 27 lb.

In the test cowlings, the engine exhaust was directed out of the slot by means of individual ducts on each cylinder. The conventional ring type exhaust collectors could be used behind the cylinders if desired, or if the engine exhausts at the front, the exhaust ring could be made the front part of the nose piece. This latter would provide a very convenient means of support for the rest of the nose piece. The complete cowling is well adapted to the use of shutters, which could be made to reduce the flow of cooling air over the entire engine if desired. It would seem that this would improve the operation of air-cooled engines very especially in cold climates.

One point regarding the application of this cowling is worth mentioning. The many modifications, which were necessary before proper cooling was obtained with the new cowling, show that it must be carefully designed. It is possible that eventually the engine manufacturers will find it advisable to furnish the engines complete with cowlings, thus insuring proper cooling conditions for their products. In that case the exhaust system could no doubt be very easily incorporated in the cowling.

In appearance, the N. A. C. A. cowling is reminiscent of the booms enclosing the old rotary engines of the war period. It gives the fuselage-engine combination longer and smoother lines which, even on a small fuselage such as that of the AT-5A, are not unpleasant to the eye.

In conclusion, it would seem from the tests made to date that a very substantial increase in high speed and all-round performance can be obtained on practically all radial engine aircraft by the use of the new N. A. C. A. complete cowlings.

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## SIDE SLIPS

By ROBERT R. OSBORN

The returns seem to be in from all but the Lloyd Lindbergh, and Herbert Hoover appears to be the President-elect. There was quite a loss in the papers over the fact that Colonel Lindbergh flew all of the way from Mexico to St. Louis for the election. If the Colonel still speaks in an effusive manner of his airplane, we should like to have seen the expression on the face of the electric bush attendant when the Colonel stepped up and said, "Well, here we are. We'd like to vote."

\*\*\*

When asked for a statement while he was at the polls, Colonel Lindbergh said he wished to deny the report that he had shot an airplane while on this hunting trip. It certainly is amazing to what ends the politicians will go in their attempt to win the presidency of these states.

We have in mind the two-track airplane headlines and in the usually great New York "Times" when they read over the North Pole: "Beyd Says No Life Near South." It is very much disappointed when the Colonel didn't make at least a one-track landing such as "Lindbergh Shoots No Game Near Antarctica."

\*\*\*

If you think the foregoing comment isn't so good, consider yourself lucky that we didn't make some crack about hoping that the questionable article in Lindbergh's hunting log wouldn't run out to be Lost Cheney.

\*\*\*

The speed with which this aviation business is progressing is entirely amazing to those of us who can remember when its total assets were comparable to those of the provincial church mouse. The latest blow comes from Dr. Hinkler, who announces, after the successful return flight to Germany of the "Graf Zeppelin," that the ship is not large enough and should be used as a training ship for larger dirigibles, in which construction will be started immediately. Possibly there are some truths to the report reaching us that an American company had ordered several dirigibles "tailor-made" for student training.

\*\*\*

Mr. H. Z. L. of New Bedford, Mass., sends us a clipping describing a flying accident. "These quick drop and landing was accomplished by allowing the plane to fall from a 'dive' into a 'slide'." If it is correct is that "Around there turns a great many of the cars can fall from a 'dive' into a 'slide' without leaving the ground!"

\*\*\*

The intrepid Aviator came in a couple of days ago wearing a newspaper clipping with the heading "Ideal Flying Age Is From 20 to 30 Years." He said he was glad to see that his "Penny" would still be good for three or four years' flying.

\*\*\*

According to the news, a motion picture has been prepared which demonstrates the actions of a pilot in taking off, flying, starting and landing a ship. Of course such a picture would be very educational to the public, but if the movie company would like to get something really worth while, we'd suggest a "Talkie" picture of one of the "hand-bled" pilots trying to turn a light plane, without wheel-brakes, with a high tail wind and then trying to get the plane to stay on the ground after a landing in the near high wind.



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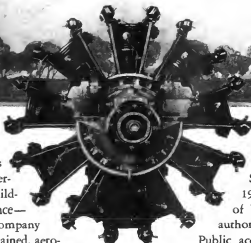
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